EET,

Removal of Contaminants from Equipment and Debris and Waste Minimization Using TECHXTRACT®

Technology Need:

The Department of Energy's (DOE's) deactivation and decommissioning (D&D) program will produce massive volumes of radioactive and/or hazardous wastes. On a mass or volumetric basis, however, the radioactive and toxic constituents in these waste streams comprise a very small percentage. Prime examples of these types of waste are equipment which was used in the production or processing of nuclear materials, structural steel from buildings, and concrete and masonry debris from building demolition.

In each of these cases, the gross contamination will have been removed in the initial stages of the D&D process. However, the existence of trace residuals requires that the materials still be treated as low level radioactive, hazardous, or mixed waste. This results in three distinct issues for the DOE Environmental Management (EM) program: (1) large, expensive waste volume, (2) failure to capture scrap or salvage values, and (3) inability to dispose of mixed waste.

Technology Description:

EET, Inc. has developed and demonstrated a full-scale, economical system for the decontamination of equipment and debris, with further treatment of secondary waste streams to minimize waste volumes. Contaminants will be removed from the subject media to levels which allow unrestricted use. The entire system will be designed with maximum flexibility and automation in mind.

The TECHXTRACT® technology is a unique and highly effective process which chemically extracts hazardous contaminants from the surface and substrate of concrete, steel, and other solid materials. This technology has been successfully used to remove contaminants as varied as

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polychlorinated biphenyls (PCB's), radionuclides, heavy metals, and hazardous organics. The process is preferred over other alternatives due to its effectiveness in safe and consistent extraction of subsurface contamination. TECHXTRACT® is a patented, proprietary process developed, owned, and provided by EET, Inc.

The TECHXTRACT® process employs as many as 25 different components in three separate chemical formulations which are used in sequence to accomplish the extraction of contaminants. The first two chemicals are surface preparation formulas which contain complex blends of acids and other chemical agents to clean dirt, oil, grease, and other interferences from the surface.The third blend uses advanced chemistry in the fields of microemulsification and chemical ion exchange to interact with and extract contaminants at the molecular level. The TECHXTRACT® technology extends the application of the chemistry to large-scale, semi-automated decontamination with an additional waste treatment step.

TECHXTRACT® incorporates a tailored process for applying and removing each of the chemicals in the right

sequence and combinations to achieve optimal results. In most projects, three different chemical formulas are used. Chemicals are applied in low volumes, usually as a spray, to minimize consumption and secondary waste volume. After being applied, the chemicals are scrubbed into the contaminated surfaces, left to dwell for a defined time, and rinsed and removed. The application and removal of all three formulas constitutes one complete process cycle, and typically requires one day (24 hours). Sampling and/or surveys can be performed at the end of any cycle, and often shows reductions of 90 percent or more per cycle.

For radioactively-contaminated metals, TECHXTRACT® is particularly applicable in situations involving equipment which is needed for ongoing operations or for return to a vendor, when there is a high salvage ("as is") value, when the scrap value is much higher if unrestricted release is achieved, or when disposal costs are extremely high. For radioactively-contaminated concrete, TECHXTRACT® offers the potential to avoid the high costs associated with demolition, repair, replacement, and disposal of large waste volumes.

Benefits:

<Non-destructive technology
<Designed for more than simple surface decontamination
<Decontaminates surplus equipment, structural steel, rubble, and other typical D&D waste streams
<Removes hazardous and radioactive contaminants (including "fixed") to meet "free release" standards
<Minimizes secondary waste volume
<Avoids disposal of valuable raw materials and allows resale
<Has very favorable economics, and can be commercialized.

Status and Accomplishments:

The contract to develop TECHXTRACT® was concluded in August 1998. The TECHXTRACT® chemical decontamination technology was demonstrated in the decontamination of lead bricks at the Hanford C-Reactor Large-Scale Demonstration and Deployment Project (LSDDP) during the week of May 11, 1998. Out of 80 bricks run through the TECHXTRACT® chemical decontamination process, 78 bricks were decontaminated to background or non-detectable levels. With the system, production throughput rates of 200 bricks per day are achievable. Secondary waste production was 0.01 gallons per brick or 6 pounds per ton of lead bricks processed.

A full-scale demonstration of TECHXTRACT® was conducted at the Princeton Plasma Physics Laboratory in September 2000 as part of the Mound Tritium D&D LSDDP. The technology successfully reduced tritium contamination on a concrete floor from 50,000 disintegrations per minute (dpm)/100 cm^2 to <400 dpm/100cm^2.

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Online Resources:

Office of Science and Technology, Technology Management System (TMS), Tech ID # 1450
http://ost.em.doe.gov/tms

The National Energy Technology Laboratory Internet address is **http://www.netl.doe.gov**

For more information, please visit the EET, Inc. website at **http://www.eetcorp.com**